CDC CENTERS FOR DISEASE CONTROL AND PREVENTION

HIV/AIDS PREVENTION

Facts about

CCR5 and Protection Against HIV-1 Infection

Recent findings from AIDS research suggest that a newly discovered variant gene may affect both susceptibility to HIV-1 infection and disease progression in persons who have become infected. The variant gene occurs primarily in persons of Western European heritage, but only about 1% appear to have two copies of it (i.e., they are "homozygotes"). About 15%-20% have one copy (i.e., are "heterozygotes"). Persons with two copies of the gene appear to have some resistance to HIV-1 infection, while those with one copy can become infected but appear to have a slower rate of disease progression.

The gene determines the structure of a protein called chemokine receptor 5 ("CKR5," now called "CCR5") found on the surface of cells which can be infected by HIV-1. Scientists have recently discovered that CCR5 is one of the proteins to which HIV-1 attaches when it enters cells to infect them. In persons with two copies of the variant CCR5 gene, the protein is always defective and does not appear at the cell surface, apparently preventing most strains of HIV-1 from entering the cell.

While evidence indicates that persons with two copies of the variant CCR5 gene may be protected against HIV-1 transmission, it is not known whether the protection is partial or complete. There is at least one other protein (called "fusin") which some strains of HIV can use instead of CCR5 to enter $CD4^+$ T-lymphocytes, the cells targeted by HIV.

Persons with one copy of the variant CCR5 gene (heterozygotes) are not protected from becoming infected with HIV. However, studies conducted by the National Cancer Institute and other research groups indicate that among persons sexually infected with HIV, those who have one copy of the variant gene may not develop AIDS quite as quickly as those who have the normal gene only. Because persons with one copy of the variant gene have some of the defective protein and some normal CCR5 protein, their cells can be infected through the normal protein.

Further research is being conducted to learn more about CCR5 and the possible protective effect of the variant gene. This information may provide help in the development of effective therapies. However, because there is no evidence of complete genetic or other natural protection against HIV infection, all persons should continue to avoid behaviors that may place them at risk for infection, primarily unprotected sexual intercourse with an HIV-infected or at-risk partner and sharing of drug-injection equipment among persons who inject drugs.

Testing for the variant gene in order to predict whether an individual is susceptible to HIV is not recommended because protection associated with the variant gene may not be complete. Although some HIV-infected persons may request testing for the variant gene to help predict the course of their disease, it is not yet clear whether the test results would be truly predictive. In addition, the test for the variant gene is only performed in a few research laboratories at present. HIV-infected persons wishing to obtain more information about the test should contact their physicians. HIV-infected persons should be under the care of a physician to enable them to receive currently available antiretroviral therapy and prophylactic treatments to prevent the development of AIDS-related opportunistic illnesses.

For more information, contact:

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